

THE EXCRETORY SYSTEM IN DIGENEA. III.

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NOTES ON THE EXCRETORY SYSTEM IN A MONOSTOME LARVA, *Cercaria spatula* NOV. SPEC.¹

In two previous papers of this series (Faust, 1919, 1919a) the writer has discussed the excretory system of an amphistome larva, *Cercaria convoluta*, and significant types of this system in distome larvæ. This paper presents data on the development and structure of the excretory system in a monostome larva, *Cercaria spatula* nov. spec. The system will be best presented by first tracing its development.

At the time when the cercaria germ-ball begins to differentiate and the tail portion becomes distinguishable from the body, the excretory system is recognizable as a pair of tubules running nearly the length of the animal. Soon the portion in the posterior part of the body proper draws together and fuses to form the bladder. Sometime after this the tail tubules coalesce to form the single median tubule of the mature larva. Meanwhile the tubules anterior to the bladder fuse with one another at their anteriormost ends, thus forming a circuitous tubule from one side to another.

At the earliest stage there is a single flame cell for each side of the body. This is situated at the anterior end of the body. Later this cell wanders backward along the lateral tubule so that at the time when the tubular circuit becomes closed the flame cell occupies a place halfway between the anterior end of the system and the bladder. It then divides into two flame cells, the fundamentals of the system. The anterior one wanders forward and by a two-fold bifurcation gives rise to four flame cells. The posterior one wanders backward and by a single bifurcation forms two cells. Thus the flame-cell number of the mature

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cercaria amounts to 12, or 6 on each side of the median line (Fig. 2). Since the two cells on each side of the body, arising from the bifurcation of the original cell, are the key to the further development of the system, the general flame-cell formula may be represented as $\alpha' + \alpha'' = 4 + 2$ or 6.

Data on the excretory system in the redia of *Cercaria spatula* furnish additional evidence in favor of the belief that this formula is valid for the excretory system in this species. In the very

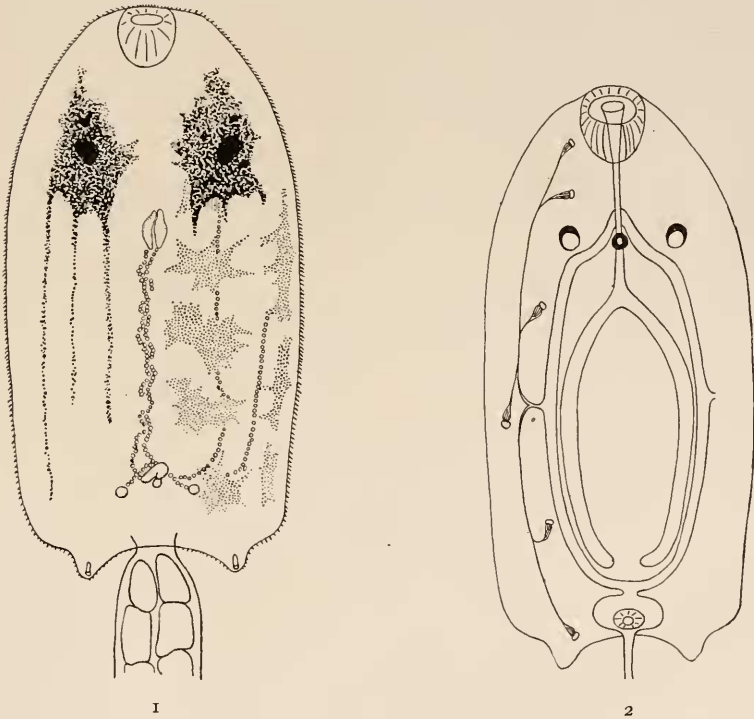


FIG. 1. *Cercaria spatula*, dorsal view, showing eye-spots, pigmentation, and genital cells. $\times 170$.

FIG. 2. *C. spatula*, dorsal view, showing digestive and excretory systems. $\times 170$.

young redia a single flame cell is found on each side of the body, at the end of a coiled tubule which opens to the outside through an inconspicuous pore. Later a single bifurcation of the flame cell and the distal end of the coiled tubule occurs so that in the mature redia the two collecting tubules on each side open outward

through a single pore (Fig. 3). In the parthenita, then, as well as in the cercaria, the basis of the system is a two-fold one, as expressed in the formula $\alpha' + \alpha''$.

While many monostome cercaria have been described and in most cases the tubular circuit has been figured in the description, the lateral system or secondary tubule has been suggested only once, in *Cercaria robusta* (Faust, 1918). Omission of the more delicate part of the system is undoubtedly due to the ease with which the main mass of the system has been observed, since it is filled with granules, and the extreme difficulty with which

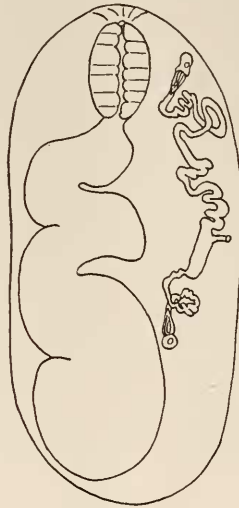


FIG. 3. Very young redia of *C. spatula*, showing digestive tract and flame-cell structure. $\times 75$.

the finer tubules are demonstrated. Since this same type of system is probably common to these two species, the formula $\alpha' + \alpha''$ is quite likely a common denominator for the family or subfamily to which they belong.

Cercaria spatula nov. spec. (Figs. 1-3.)

Systematic position: larval monostome, probably Notocotylidæ.

Parthenita: redia.

Host: *Physa gyrina* Say.

Habitat: Urbana, Illinois, 1918.

Flame-cell formula: $\alpha' + \alpha'' = 4 + 2$ or 6.

Monostome larva of spatulate outline, with a length of about 0.5 mm. and a width of nearly half that measurement; tail equally long and capable of great distension along its transverse axis and great extension along its longitudinal axis. Body entirely covered with minute spines. Trioculate, with dense masses of melanoidin pigment around the lateral eyes, extending caudad along the six posterior nerve trunks; integument of entire body more or less infiltrated with pigment granules. Locomotor pockets at posterior part of body, small, simple. Tail aspinose with six continuous pairs of large vacuolated cells at sides of caudal excretory canal.

Oral sucker leading into a long narrow esophagus; esophagus branching some little distance behind the median eye to form a typical furculum.

Excretory bladder ovate, transversely compressed, with a strong sphincter; main circuitous collecting tubule with a main branch on each side; flame cells anterior to main branch four posterior to main branch two.

Genital organs consisting of median ovary, paired testes in plane slightly behind ovary, uterus and vas deferens leading forward respectively to vagina and cirrus sac; vitellaria of two series of five inner and three outer glands on dorsal side of body.

Redia with long rhabdocœl gut, strong pharynx lined with transverse chitinous ribbing, and spines anterior and posterior to pharynx. Birthpore inconspicuous. Flame cells two for each side of the body.

Cystogenous granules many, densely opaque. Decaudation slow; encystment very slow.

SUMMARY.

1. Development of the excretory system in the monostome larva *Cercaria spatula* nov. spec. gives support to the principle of orderly development and conservatism of the system in monostome larvæ.

2. Comparison of the system in the cercaria and redia of this species yields evidence that there is a fundamental homology of the units in the hermaphroditic and the parthenogenetic generations of this fluke.

REFERENCES CITED.

Faust, E. C.

- '18 Studies on Illinois Cercariæ. Jour. Parasit., 4, 93-110, 2 pl.
- '19 The Excretory System in Digenea. I. Notes on the Excretory System of an Amphistome, *Cercaria convoluta* nov. spec. BIOL. BULL., 36, 315-321.
- '19a The Excretory System in Digenea. II. Observations on the Excretory System in Distome Cercariæ. BIOL. BULL., 36, 322-339.